Risk factor	Incidence of the risk factor (%)	Univariate odds ratio (95% CI)	p value
Atrial fibrillation	152/890 (17%)	2.06 (1.27–3.34)	<0.003
LAA Th	11/935 (1%)	7.54 (2.2–25.2)	<0.001
SEC in LA	130/873 (15%)	2.94 (1.8–10.7)	<0.001
Th in aortic arch	20/865 (2%)	2.76 (0.98–7.7)	<0.04
SEC in aortic arch	21/869 (2%)	6.73 (2.7–16.4)	<0.001
Non ipsilateral CS	91/818 (11%)	2.02 (1.10–3.68)	<0.01

LAA = left atrial appendage; Th = thrombus; SEC = spontaneous echo contrast; LA = left atrium; Non ipsilateral CS = Carotid stenosis (≥ 60% narrowing) non ipsilateral to the side of cerebral ischemia.

Conclusion: this preliminary analysis of the data indicated that TEE and CED are useful tools in identifying high risk pts for subsequent clinical events such as fatal or non fatal relapse of cerebral ischemia, systemic embolism or cardiac death within the first year after the first stroke or TIA.

749 Myocardial Hibernation/Stunning – Detection of Viability

Tuesday, March 26, 1996, 10:30 a.m.–Noon
Orange County Convention Center, Room 208

10:30

749-1 What Is the Prevalence of Hibernating Myocardium?

Timothy F. Christian, Todd D. Miller, David O. Hodge, Raymond J. Gibbons. *Mayo Clinic, Rochester, Minnesota*

There has been a great interest in the detection of hibernating myocardium, but little is known about its true prevalence in unselected patients with coronary artery disease and abnormal ventricular function. The purpose of this study was to ascertain the relevance of hibernating myocardium by examining global left ventricular ejection fraction (LVEF) response to revascularization without requiring specific pre-operative testing for hibernating myocardium that may cause post-test referral bias. Equilibrium radionuclide angiography was performed in 86 patients (76 male, 10 female) within one year prior to bypass surgery (46 ± 73 days) and anytime thereafter (492 ± 563 days). All patients had a pre-operative resting LVEF < 0.50. Reproducibility of ejection fraction by this method for an individual patient on separate acquisitions is 4 LVEF points. A definite improvement in LVEF (post versus pre-bypass surgery) was defined as an increase of 8 points (95% confidence limits) and a probable improvement was defined as a 4 point increase (67% confidence limits). Prior myocardial infarction was present in 85% of patients. There was no significant change in LVEF for the overall study group (0.39 ± 0.08 pre- versus 0.38 ± 0.10 post-bypass surgery, p = NS), although many patients met the above definitions for improvement:

	LVEF change < 0.04	LVEF increase > 0.04	LVEF increase > 0.08
n (%)	58 (67%)	28 (33%)	18 (21%)

No clinical parameters were predictive of LVEF improvement.

Conclusion: In the absence of specific preoperative testing that may lead to referral bias, the prevalence of hibernating myocardium is significant, comprising up to one third of patients sent to bypass surgery with abnormal ventricular function. Noninvasive identification of such patients should remain a high priority.

10:45

749-2 Thallium Imaging, Dobutamine Echocardiography and Positron Emission Tomography for the Assessment of Myocardial Viability

Hal A. Skopicki, Neil J. Weissman, Geoffrey A. Rose, Anil Mukerjee, Stephanie A. Coulter, Alan Fischman, Michael H. Picard, Henry Gewirtz, Stephen A. Abraham. *Mass General Hosp., Boston, MA*

Thallium imaging (^{201}Tl), dobutamine echocardiography (DE) and positron emission tomography (PET) have all been utilized to predict improved wall motion (IWM) after surgical revascularization (CABG). However, no systematic comparison of all three modalities has been performed in the same patients (pts). This study tested the hypothesis that ^{201}Tl, DE, and PET are equally effective in predicting IWM after CABG. Fifty-one pts with angiographically proven coronary artery disease underwent ^{201}Tl (stress-reinjection n = 16, rest-redistribution n = 4), DE (5–40 ug/kg/min, modified for pts on B-blockers), and PET (NH_3/FDG). Viability was assessed in a 24 segment model and defined as follows: ^{201}Tl-normalization, mild-moderate fixed defects, and normal uptake, DE-IWM ≥ 1 grade, and PET-FDG/NH3 mismatch and mild-moderate matched defects. Twenty-seven pts underwent CABG and 24 were treated medically. Twenty pts (17 men, 3 women; mean age 63 ± 12 years; mean LVEF 0.41 ± 0.17 with 10 pts ≤ 0.40) are presented herein.

Test	Sensitivity	Specificity	Accuracy	PPV	NPV
^{201}Tl	84.0%	52.0%	66.7%	59.7%	79.3%
DE	65.0%	77.6%	72.1%	69.0%	74.2%
PET	81.7%	76.0%	78.6%	74.1%	83.2%

^{201}Tl and PET were equally and significantly more sensitive than DE for predicting IWM, while DE was more specific than ^{201}Tl ($P < 0.01$). A stepwise strategy utilizing both ^{201}Tl and DE may provide viability assessment comparable to PET in certain pts.

11:00

749-3 Resting Tc-99m Sestamibi SPECT Underestimates Myocardial Viability in Patients With Severe Ischemic Left Ventricular Dysfunction: Comparison With Ammonia/FDG PET

James A. Arrighi, Chin K. Ng, Holley Dey, Frans J. Th. Wackers, Robert Soufer. *Yale-VAMC PET Center, West Haven, CT*

Studies investigating the utility of Tc-99m sestamibi (SM) for the detection of viable myocardium (VM) in patients with coronary artery disease (CAD) and left ventricular (LV) dysfunction have yielded conflicting results. In patients with severe LV dysfunction, in whom the question of myocardial viability is most important, metabolic imaging with PET may be needed for optimal detection of VM. To assess whether SM performs less favorably for VM detection in patients with severe LV dysfunction, we studied 29 pts with chronic CAD and LV dysfunction. Pts were divided into those with mild-to-moderate LV dysfunction (EF > 25%, n = 12, group 1), and severe LV dysfunction (EF < 25%, n = 17, group 2). All pts underwent quantitative SM SPECT and N-13 ammonia/FDG PET, both at rest. A total of 618 regions were analyzed; 314 of these had abnormal resting flow by PET and were subsequently analyzed for VM and nonviable (NV) myocardium (117 and 197 regions in groups 1 and 2 respectively) using PET and SM SPECT:

	EF %	PET Viable		PET Nonviable	
		SM VM	SM NV	SM VM	SM NV
Group 1	39 ± 8	84 (88%)	12 (12%)	11 (52%)	10 (48%)
Group 2	18 ± 5	99 (58%)	72 (42%)	1 (4%)	25 (96%)

Thus, while resting SM SPECT accurately identifies VM in CAD pts with mild-to-moderate LV dysfunction, it underestimates the amount of VM in pts with CAD and severely depressed LV function. For the identification of NV myocardium, however, SM SPECT performs more accurately in pts with severely depressed LV function.

11:15

749-4 Myocardial Viability and Tc99m-MIBI: Correlation With PET, Function and Histology

Alex Maes, Willem Flameng, Marcel Borgers, Paul Sergeant, Johan Nuyts, Guy Bormans, Frans Van de Werf. *Luc Mortelmans University Hospital Gasthuisberg, Leuven, Belgium*

The value of Tc99m-MIBI as a viability tracer was investigated in patients undergoing bypass surgery (CABG). Viability was evaluated using positron emission tomography (PET), functional follow up after CABG and histologic data. A PET flow (NH3) and metabolism (18FDG) study, a TC99m-MIBI resting study and a nuclear angiography were performed 1 or 2 days before bypass surgery. Two preoperative transmural biopsies were taken from the left ventricular anterior wall. Morphometry was performed to assess the percentage fibrosis. After 3 months, a radionuclide angiography was repeated. 30 patients were prospectively included. Statistically significant higher MIBI values were found in the PET mismatch group as compared to the PET match group (79 ± 17% vs 51 ± 23%, p = 0.02). A linear relationship was found between MIBI uptake and the amount of fibrotic tissue in the biopsy (r = 0.78, $p < 0.0001$). Significant higher MIBI values were found in the group with enhanced ventricular function at 3 months (78 ± 11% vs 49 ± 17%, p = 0.004). Using a cutoff point of 60% of peak for MIBI, and functional improvement after surgery as gold standard for viability, a positive predictive value of 73% and a negative predictive value of 75% were found. It can be concluded that TC99m-MIBI uptake was significantly higher in PET mismatch areas and in regions with enhanced contractility at 3 months. A linear relationship was found between % fibrosis and MIBI uptake. Using a cutoff value of 60%, positive and negative predictive values around 75% were found.